Lab 5: PID Controller Design

*ECE 564: Fundamentals of Autonomous Robots Lab*

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*September 23, 2019*

*The group members have worked together and face-to-face at all stages of this project work. The contributions of members to the report and to the codes are equal.*

*(Initials of group members)*

# Introduction

# Lab Parts

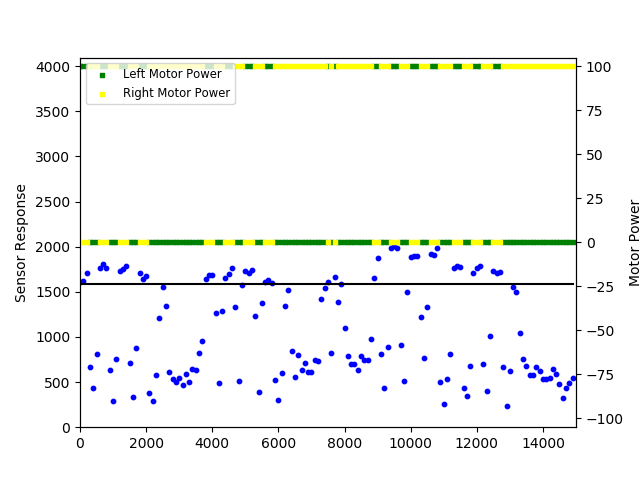
## Primitive Wall Follow

### Quick Turn Wall Follow

#### Algorithm



#### Experiment



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Source** | **min** | **max** | **average** | **standard deviation** |
| sensor response | 239 | 2005 | 1020.153 | 546.1335 |
| left motor data | 0 | 100 | 30.66667 | 46.26545 |
| right motor data | 0 | 100 | 69.33333 | 46.26545 |

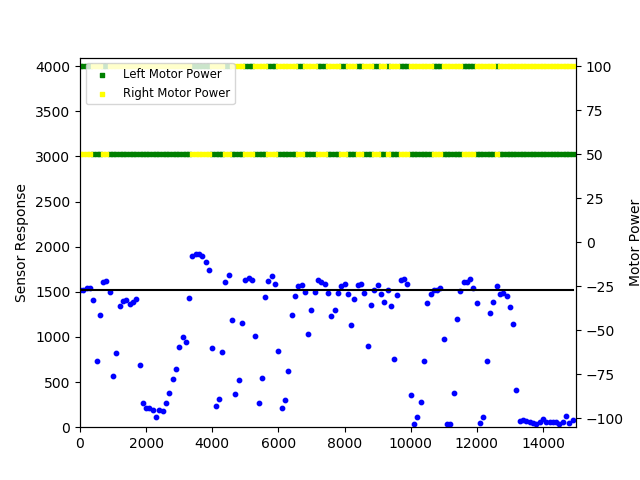
#### Analysis

### Primitive Gentle Turn Wall Follow

#### Algorithm



#### Experiment



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Source** | **min** | **max** | **average** | **standard deviation** |
| sensor response | 32 | 1922 | 1020.1533 | 613.0113451 |
| left motor data | 50 | 100 | 64.333333 | 22.6859702 |
| right motor data | 50 | 100 | 85.666667 | 22.6859702 |

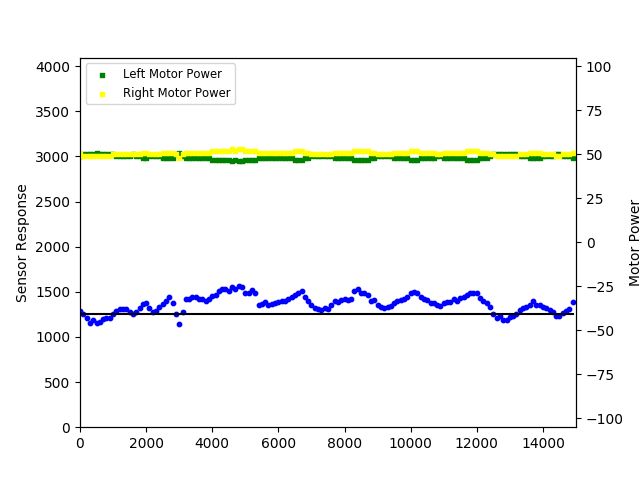
#### Analysis

## Wall Following with P (Proportional) Controller Primitive Wall Follow

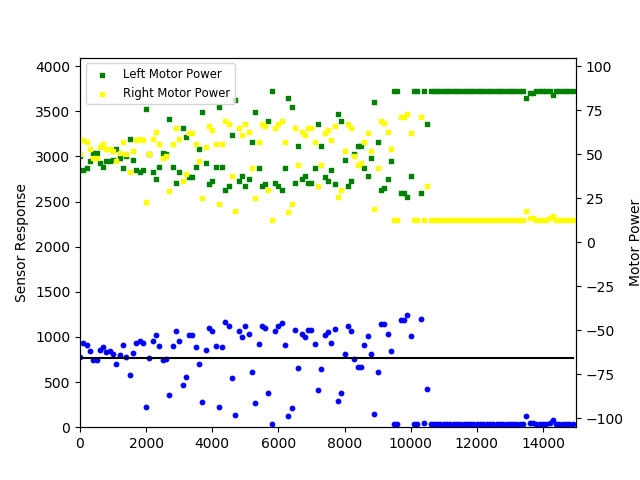
### Algorithm



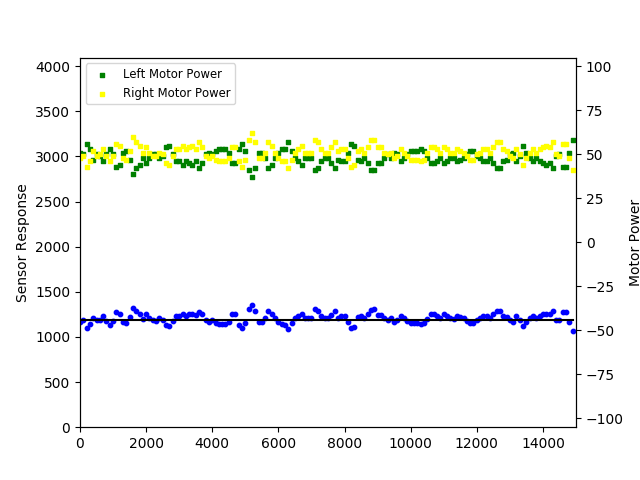
### Kp = 0.01



### Kp = 0.04



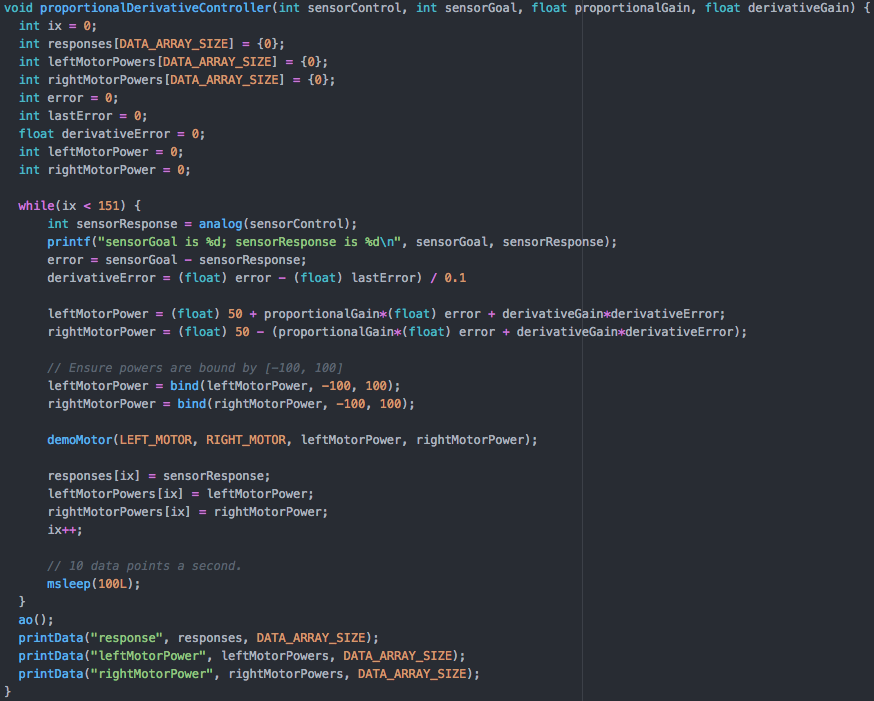
### Kp = 0.0075



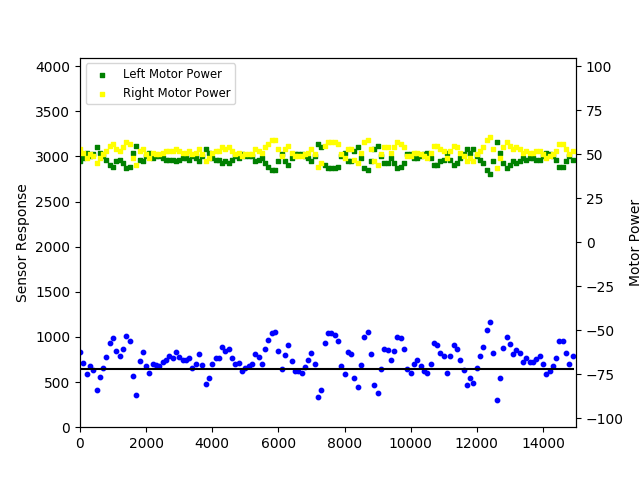
#### Analysis

## Wall Following with PD (Proportional and Derivative) Controller

### Algorithm



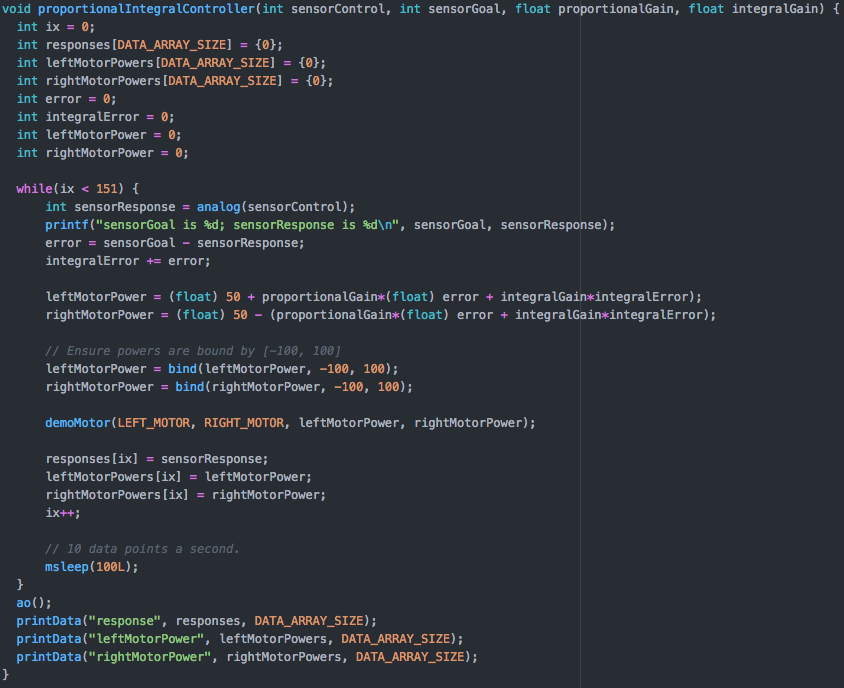
### Kp = 0.02, Kd = 0.000076



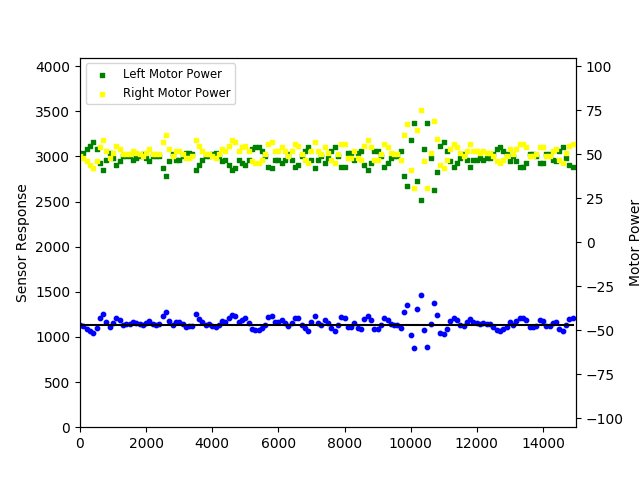
### Analysis

## Wall Following with PI (Proportional and Integral) Controller

### Algorithm

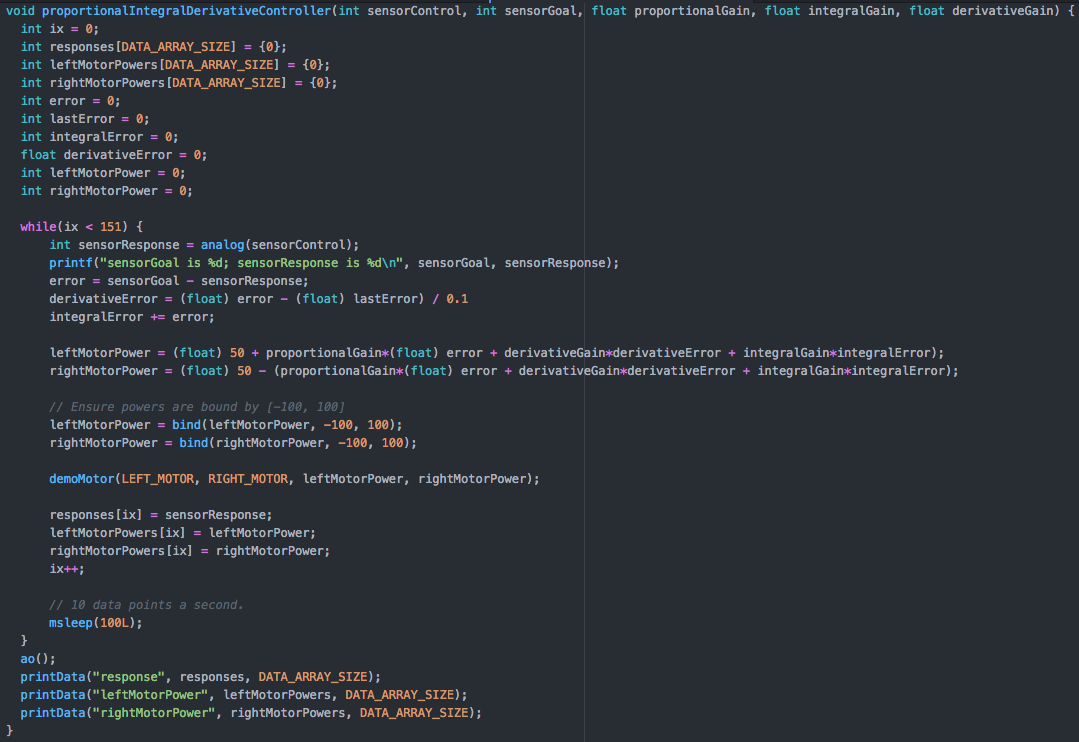


### Kp = 0.075, Ki = 0.0005

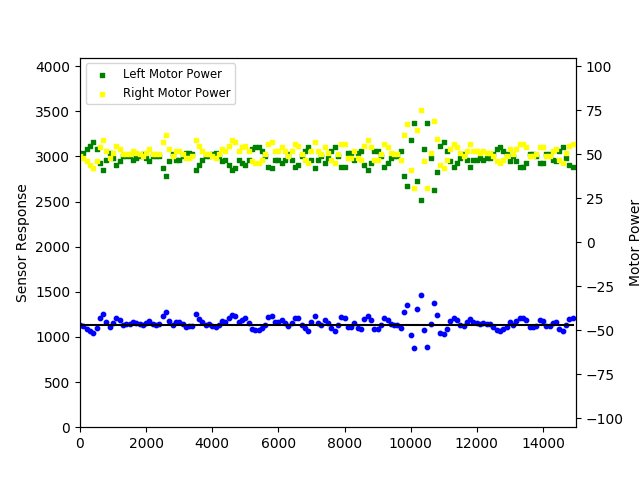


## Wall Following with PID (Proportional, Integral, and Derivative) Controller

### Algorithm



### Kp = 0.02, Ki = 0.000076, Kd = 0.0002



# Conclusion

# Suggestions